

# SEQUENCE LISTING

<110> Japan International Research Center for Agricultural Sciences

<120> Full-length Genomic RNA of Papaya Leaf-Distortion Mosaic Virus

<130> PH-1176

<150> JP 2001-040523

<151> 2001-02-16

<160> 4

<170> PatentIn Ver. 2.0

<210> 1

<211> 10155

<212> RNA

<213> Papaya Leaf-Distortion Mosaic Virus

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ucauuuugug caauuacaaa cuuugcauuu auucaacauu uccagcuuuu aaaacgaaua 120

acacacacag acaac aug ucg auu guu auu ggu gau uuu ucc auc cca cuc 171

Met Ser Ile Val Ile Gly Asp Phe Ser Ile Pro Leu

1

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auc ugc aga acu gag cag auu gaa ugu guu cgu cuu guu ccu gga aca 219

Ile Cys Arg Thr Glu Gln Ile Glu Cys Val Arg Leu Val Pro Gly Thr

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aga guu gaa gaa gug aag acc auu aaa aag guc uua aaa aca cac uac 267

Arg Val Glu Glu Val Lys Thr Ile Lys Lys Val Leu Lys Thr His Tyr

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caa gaa aua acu cuu ggu ugu acu gau aga ugc gcg ggc cug agc gca 315

Gln Glu Ile Thr Leu Gly Cys Thr Asp Arg Cys Ala Gly Leu Ser Ala

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uac aca aaa acc ucc cuu aag aga gca auu aag gaa aag gau uua acu 363

Tyr Thr Lys Thr Ser Leu Lys Arg Ala Ile Lys Glu Lys Asp Leu Thr  
65 70 75

gca ucu ggc agu ugu uuc cac ugu ggc cuu aga gca caa auc gga gag 411  
Ala Ser Gly Ser Cys Phe His Cys Gly Leu Arg Ala Gln Ile Gly Glu  
80 85 90

ggc aga aaa agc gaa gaa uua gca ccc auu uca guc aug gag gau guu 459  
Gly Arg Lys Arg Val Glu Leu Ala Pro Ile Ser Val Met Glu Asp Val  
95 100 105

gaa acu gug gaa caa gaa cuu guu cca ugu aug gaa gag aag uau 507  
Glu Thr Val Glu Gln Val Leu Val Pro Cys Met Val Glu Glu Lys Tyr  
110 115 120

uau aag gaa guu ugc aau uuc cag aag gcu acg cuc auc gac aaa cca 555  
Tyr Lys Glu Val Ser Asn Phe Gln Lys Ala Thr Leu Ile Asp Lys Pro  
125 130 135 140

aag cua acu aua gcc cca guu uua aug gca caa ccu gcc caa gug cca 603  
Lys Leu Thr Ile Ala Pro Val Leu Met Ala Gln Pro Ala Gln Val Pro  
145 150 155

agg ccc gcu guu uuu aau gaa aua cga aaa guu cau gag gag aug aag 651  
Arg Pro Ala Val Phe Asn Glu Ile Arg Lys Val His Glu Glu Met Lys  
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ucc caa acc ucu gaa aac aag guc uua gaa gag gaa acu caa ugc gcc 699

Ser Gln Thr Ser Glu Asn Lys Val Leu Glu Glu Glu Thr Gln Cys Ala

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agu gau gca gcg cuu cac cac uua gac gac guu cau gcg ugu aga gcu 747

Ser Asp Ala Ala Leu His His Leu Asp Asp Val His Ala Cys Arg Ala

190

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cga gca cag gua ggc auu gaa gcg aua cua gcc aga cau gca agg cau 795

Arg Ala Gln Val Gly Ile Glu Arg Ile Leu Ala Arg His Ala Arg His

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215

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aga auc gag gcu aga cag caa guu gaa gag gag caa ucg gaa gca uua 843

Arg Ile Glu Ala Arg Gln Gln Val Glu Glu Glu Gln Ser Glu Ala Leu

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230

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gca gcg uuc gaa ucc uuc uuc aau caa acu cac aga gaa gac aga uau 891

Ala Ala Phe Glu Ser Phe Phe Asn Gln Thr His Arg Glu Asp Arg Tyr

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gaa ggg aaa guc uua acc auu cga aau ggg auc aca gcg ugg uuu gaa 939

Glu Gly Lys Val Leu Thr Ile Arg Asn Gly Ile Thr Gly Trp Phe Glu

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cca aau agg aau gau auu aag aac gca gcu agg cgg agg aag aga gcu 987

Pro Asn Arg Asn Asp Ile Lys Asn Ala Ala Arg Arg Arg Lys Arg Ala

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aac aag aaa auc ccg uuu guu gca cgu gaa aau gac guc gcg cgg aua 1035

Asn Lys Lys Ile Pro Phe Val Ala Arg Glu Asn Asp Val Ala Arg Ile  
285 290 295 300

gaa acu cau gaa ccu aac guc aaa gag gag aca aaa gau gug gag gaa 1083  
Glu Thr His Glu Pro Asn Val Lys Glu Glu Thr Lys Asp Val Glu Glu  
305 310 315

gca acu gac aca uac aca uuu aag aag cag cgc aaU gau aaa aag aga 1131  
Ala Thr Asp Thr Tyr Thr Phe Lys Lys Gln Arg Asn Asp Lys Lys Arg  
320 325 330

gug cug aaa gaa aaU gug ucu cuu agu aug gcg cgc auu aaU gaa cuu 1179  
Val Leu Lys Glu Asn Val Ser Leu Ser Met Ala Arg Ile Asn Glu Leu  
335 340 345

guc cga ugu guu aca aaa uua ugc cga aaa gau uca aag gag cuu gag 1227  
Val Arg Cys Val Thr Lys Leu Cys Arg Lys Asp Ser Lys Glu Leu Glu  
350 355 360

uuu auc ggc aag aga gga agu cuu cga guu caa ugu acu aaa aaU ugu 1275  
Phe Ile Gly Lys Arg Gly Ser Leu Arg Val Gln Cys Thr Lys Asn Cys  
365 370 375 380

ggU uca cga gug aua cua aga cac uug cgu gga gaa cuu aga aga aaa 1323  
Gly Ser Arg Val Ile Leu Arg His Leu Arg Gly Glu Leu Arg Arg Lys  
385 390 395

gau ugu uau ugg gau cgu auc auu gag aaU uuc uuU gaa auu gca gcU 1371

Asp Cys Tyr Trp Asp Arg Ile Ile Glu Asn Phe Phe Glu Ile Ala Ala  
 400 405 410

gca aag cuu cag aau aag aau cuc aau aac aau gaa ucu gug agg aga 1419  
 Ala Lys Leu Gln Asn Lys Asn Leu Asn Asn Asn Glu Ser Val Arg Arg  
 415 420 425

ggg cac agu gga cau auc auu caa uau gau aag uuu aga ggu uug agu 1467  
 Gly His Ser Gly His Ile Ile Gln Tyr Asp Lys Phe Arg Gly Leu Ser  
 430 435 440

gga cgg cau uuc gga agu uac auc auu guu agg ggu agc aug gau ggc 1515  
 Gly Arg His Phe Gly Ser Tyr Ile Ile Val Arg Gly Ser Met Asp Gly  
 445 450 455 460

aga auu auu gac gcu cgu uca aag auc aca cac agc guu aug auc aac 1563  
 Arg Ile Ile Asp Ala Arg Ser Lys Ile Thr His Ser Val Met Ile Asn  
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aug acc cac uac agu gau gca ggu uug agu uuu ugg aaa ggu uuu gau 1611  
 Met Thr His Tyr Ser Asp Ala Gly Leu Ser Phe Trp Lys Gly Phe Asp  
 480 485 490

cgu caa uuu auu gac auu cga gau aga ccu aag aac gcu cau gag ugc 1659  
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 495 500 505

aag gcc acu aua aac guu gag gag ugu ggc gaa aug gca gcc auu gua 1707

Lys Ala Thr Ile Asn Val Glu Glu Cys Gly Glu Met Ala Ala Ile Val

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aac caa cuc cua uuu cca aug ugg aaa aua aca ugc acu caa ugu gga 1755

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gaa cug cuu gaa aug uug uca caa gaa gag gaa cuu gaa ucu uuc agg 1803

Glu Leu Leu Glu Met Leu Ser Gln Glu Glu Glu Leu Glu Ser Phe Arg

545

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555

cgu aaa agg agc caa uug gca agu aaa uua ucc agu cuu cau auc aaa 1851

Arg Lys Arg Ser Gln Leu Ala Ser Lys Leu Ser Ser Leu His Ile Lys

560

565

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uuu ccu uac gug gau cau uuu cuu aau cga uau gag aau agu cug aau 1899

Phe Pro Tyr Val Asp His Phe Leu Asn Arg Tyr Glu Asn Ser Leu Asn

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cgg aug aac aca aac uuc gau gcg cac aaa caa auu gca caa auu auu 1947

Arg Met Asn Thr Asn Phe Asp Ala His Lys Gln Ile Ala Gln Ile Ile

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ggc agu cgc aaa gag auu ccu uuu uca aau uua gag cau cug aau gaa 1995

Gly Ser Arg Lys Glu Ile Pro Phe Ser Asn Leu Glu His Leu Asn Glu

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620

uug cua auu aag ucg gau aaa cuu guu agc gag gau uuc uau gaa aug 2043

Leu Leu Ile Lys Ser Asp Lys Leu Val Ser Glu Asp Phe Tyr Glu Met  
 625 630 635

ucu caa ugc cuu uua gag cua aca cgc ugg cau aaa aac agg agc gau 2091  
 Ser Gln Cys Leu Leu Glu Leu Thr Arg Trp His Lys Asn Arg Ser Asp  
 640 645 650

uca uuc aag aag gga gag auu cac cau uuc cga aaU aag aug uca ggu 2139  
 Ser Phe Lys Lys Gly Glu Ile His His Phe Arg Asn Lys Met Ser Gly  
 655 660 665

aaa gca caa uuu aaU uuu gca uug aug ugu gac aac caa cuu gac aaa 2187  
 Lys Ala Gln Phe Asn Phe Ala Leu Met Cys Asp Asn Gln Leu Asp Lys  
 670 675 680

aaU ggu aac uuc gug ugg ggu gaa aga ggu uau cau gcg aag agg uuu 2235  
 Asn Gly Asn Phe Val Trp Gly Glu Arg Gly Tyr His Ala Lys Arg Phe  
 685 690 695 700

uuc uua aac uuc uuu gag aaa guu gau uca acu gac ggu uau aag aaa 2283  
 Phe Leu Asn Phe Phe Glu Lys Val Asp Ser Thr Asp Gly Tyr Lys Lys  
 705 710 715

cac aua aug cga guc aac cca aaU ggc aca aga caa aca gcu aua gga 2331  
 His Ile Met Arg Val Asn Pro Asn Gly Thr Arg Gln Thr Ala Ile Gly  
 720 725 730

aaa cug auu uua ucg acg gau cca ucu acg cua cga caa caa aug aaa 2379



Lys Leu Ile Leu Ser Thr Asp Pro Ser Thr Leu Arg Gln Gln Met Lys

735

740

745

ggc agc cca auc aca aga guu cca guu ggu aaa uau ugu aca agc aaa 2427

Gly Ser Pro Ile Thr Arg Val Pro Val Gly Lys Tyr Cys Thr Ser Lys

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755

760

aga gau ggu ugu uac guc uau cca gca ugc ugu guu aca aug gaa gau 2475

Arg Asp Gly Cys Tyr Val Tyr Pro Ala Cys Cys Val Thr Met Glu Asp

765

770

775

780

ggc acg cca uug uuu ucu gau auc aag aug cca acu aag aau cau cua 2523

Gly Thr Pro Leu Phe Ser Asp Ile Lys Met Pro Thr Lys Asn His Leu

785

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guc auu gga aau uca gga gau cca aag uau gug gau gua cca agc agc 2571

Val Ile Gly Asn Ser Gly Asp Pro Lys Tyr Val Asp Val Pro Ser Ser

800

805

810

uca agu gac aug auu gug gcu aag gaa ggu uau ugu uau cuc aac auu 2619

Ser Ser Asp Met Ile Val Ala Lys Glu Gly Tyr Cys Tyr Leu Asn Ile

815

820

825

uuc uug gca aug uug cug aau gug aau gag agu gaa uca aaa uca uuc 2667

Phe Leu Ala Met Leu Leu Asn Val Asn Glu Ser Glu Ser Lys Ser Phe

830

835

840

aca aag aag guu aga gau aua auu gua ccg cgu cuc ggu caa ugg cca 2715

Thr Lys Lys Val Arg Asp Ile Ile Val Pro Arg Leu Gly Gln Trp Pro  
845 850 855 860

agc uua auc gau guu gca acu gaa ugu uac uuc cua uca gcc uuc cac 2763  
Ser Leu Ile Asp Val Ala Thr Glu Cys Tyr Phe Leu Ser Ala Phe His  
865 870 875

ccu gaa acg aaa aau gcu gag uug ccc cga auu cua gug gau cau aca 2811  
Pro Glu Thr Lys Asn Ala Glu Leu Pro Arg Ile Leu Val Asp His Thr  
880 885 890

uca aaa ugu aug cau gug auc gau uca uau ggc ucg cua gac acg caa 2859  
Ser Lys Cys Met His Val Ile Asp Ser Tyr Gly Ser Leu Asp Thr Gln  
895 900 905

uuu cau guu cug aag gca aau acu gua agu cag cua auu aaa uuc gcc 2907  
Phe His Val Leu Lys Ala Asn Thr Val Ser Gln Leu Ile Lys Phe Ala  
910 915 920

gau aau gac uug gau ucg gag cug aaa cau uau uua gua ggu gga gac 2955  
Asp Asn Asp Leu Asp Ser Glu Leu Lys His Tyr Leu Val Gly Gly Asp  
925 930 935 940

cuc cau agc aag caa gcu ccu cag ugu ucc aua aaa uua cuc ugu aaa 3003  
Leu His Ser Lys Gln Ala Pro Gln Cys Ser Ile Lys Leu Leu Cys Lys  
945 950 955

ugu aua uau agg ccu aaa uug aug agg caa ugc auu gag gaa gag ccu 3051

Cys Ile Tyr Arg Pro Lys Leu Met Arg Gln Cys Ile Glu Glu Glu Pro  
 960 965 970

uuu uug uug auu uua gcg ugu auc uca cca ggu guu uua uua gcu uua 3099  
 Phe Leu Leu Ile Leu Ala Cys Ile Ser Pro Gly Val Leu Leu Ala Leu  
 975 980 985

uau aau agu cag cau uua gaa uua gcu uua aag uac ugg aug agc aag 3147  
 Tyr Asn Ser Gln His Leu Glu Leu Ala Leu Lys Tyr Trp Met Ser Lys  
 990 995 1000

caa cag ucu guc gcu gcu uua uuu gca aug auc cau gga cua gcu gca 3195  
 Gln Gln Ser Val Ala Ala Leu Phe Ala Met Ile His Gly Leu Ala Ala  
 1005 1010 1015 1020

aaa gua aca guu gcu caa aca uug aau gag cag aga cua aua cuu gaa 3243  
 Lys Val Thr Val Ala Gln Thr Leu Asn Glu Gln Arg Leu Ile Leu Glu  
 1025 1030 1035

gcg ggg gcg gcg aau uug auu ucg guc aug gaa acc aua cac aug aca 3291  
 Arg Gly Ala Arg Asn Leu Ile Ser Val Met Glu Thr Ile His Met Thr  
 1040 1045 1050

agc cau uca uac caa ccc gcg cuu cuu caa cua cag guc aug gca aau 3339  
 Ser His Ser Tyr Gln Pro Ala Leu Leu Gln Leu Gln Val Met Ala Asn  
 1055 1060 1065

cgu aga gac aug aau ucc acu cuu gau cuc gcc gga uuc agc aua uua 3387

Arg Arg Asp Met Asn Ser Thr Leu Asp Leu Ala Gly Phe Ser Ile Leu  
 1070 1075 1080

caa ucu gaa gau agu aug uau ugg aug gaa aaa agu uau cuc aug gaa 3435  
 Gln Ser Glu Asp Ser Met Tyr Trp Met Glu Lys Ser Tyr Leu Met Glu  
 1085 1090 1095 1100

uua gag gau ucg ugg aac gac uua aag ugg uug gaa aaa uua caa gaa 3483  
 Leu Glu Asp Ser Trp Asn Asp Leu Lys Trp Leu Glu Lys Leu Gln Glu  
 1105 1110 1115

aug ugg cga uua uca aag uac uca aua ucu ggg aua agu caa cuu uca 3531  
 Met Trp Arg Leu Ser Lys Tyr Ser Ile Ser Gly Ile Ser Gln Leu Ser  
 1120 1125 1130

aug aaa ggc gcu acc gau uua ggc ggu cga uau uca gua ucu gca aag 3579  
 Met Lys Gly Ala Thr Asp Leu Gly Gly Arg Tyr Ser Val Ser Ala Lys  
 1135 1140 1145

cag uuu aua aca uca gug aug aaa ccu guc aag aaa ucu ugu gua aaa 3627  
 Gln Phe Ile Thr Ser Val Met Lys Pro Val Lys Lys Ser Cys Val Lys  
 1150 1155 1160

gca aga gau acu ugu aag gaa gua auc auc aau aca aca ucc ugg aca 3675  
 Ala Arg Asp Thr Cys Lys Glu Val Ile Ile Asn Thr Thr Ser Trp Thr  
 1165 1170 1175 1180

uuu cgg gca aca uuu ucu uug ugu agg ugg ugc uug ccu gau ugu uug 3723

Phe Arg Ala Thr Phe Ser Leu Cys Arg Trp Cys Leu Pro Asp Cys Leu

1185

1190

1195

aag uuu aua aac aug cuu aua guu aua agu uug auu cuc agc auu ugg 3771

Lys Phe Ile Asn Met Leu Ile Val Ile Ser Leu Ile Leu Ser Ile Trp

1200

1205

1210

cau uca gcu aaU ucu aua ucg uuc gac uau gca caa aug aag aga gaa 3819

His Ser Ala Asn Ser Ile Ser Phe Asp Tyr Ala Gln Met Lys Arg Glu

1215

1220

1225

aag cag gug aaU auc gag aaa guu cug aug aaU aaU uua gug gcc cuu 3867

Lys Gln Val Asn Ile Glu Lys Val Leu Met Asn Asn Leu Val Ala Leu

1230

1235

1240

cau aag gag cag aua aag auc aaU cca gac cug aca aag gaa gaa uuU 3915

His Lys Glu Gln Ile Lys Ile Asn Pro Asp Leu Thr Lys Glu Glu Phe

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1250

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1260

aag gag uac auU gca aga agu aga ccU gag cug auU gca uua guu aaU 3963

Lys Glu Tyr Ile Ala Arg Ser Arg Pro Glu Leu Ile Ala Leu Val Asn

1265

1270

1275

aaa gaa uug caa gaa gaa guu gau cau caa gcu aag cgc aaa ggu gaa 4011

Lys Glu Leu Gln Glu Glu Val Asp His Gln Ala Lys Arg Lys Gly Glu

1280

1285

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caa aac uug gag aaa auU aua gca uuU guu gcc uua guu aug aug auU 4059

Gln Asn Leu Glu Lys Ile Ile Ala Phe Val Ala Leu Val Met Met Ile  
 1295 1300 1305

uuu gac uca gag aaa agu gau ugu gua uau aag aca cug aac aaa uug 4107  
 Phe Asp Ser Glu Lys Ser Asp Cys Val Tyr Lys Thr Leu Asn Lys Leu  
 1310 1315 1320

cga aau cuc guu gcc aca ugu gau gaa ccu guc gca cau caa agc uug 4155  
 Arg Asn Leu Val Ala Thr Cys Asp Glu Pro Val Ala His Gln Ser Leu  
 1325 1330 1335 1340

gac gac auu caa gac auc uug acu gac aaa gaa aca acc auu gau uuc 4203  
 Asp Asp Ile Gln Asp Ile Leu Thr Asp Lys Glu Thr Thr Ile Asp Phe  
 1345 1350 1355

gac uua gau ugu gag ggg agc aaa guu aca gag uuc aag gag aug aac 4251  
 Asp Leu Asp Cys Glu Gly Ser Lys Val Thr Glu Phe Lys Glu Met Asn  
 1360 1365 1370

uuu gcc gca ugg ugg gaa aaa caa cua caa ugu gau aga gug gua ccc 4299  
 Phe Ala Ala Trp Trp Glu Lys Gln Leu Gln Cys Asp Arg Val Val Pro  
 1375 1380 1385

cau uau aga acc acu ggg aaa uuu auu gaa uuc acu cgu gaa agc ugu 4347  
 His Tyr Arg Thr Thr Gly Lys Phe Ile Glu Phe Thr Arg Glu Ser Cys  
 1390 1395 1400

guu agu gug agu aac aca aua ucu cau gcc ccu gag aaa gaa ugg aua 4395

Val Ser Val Ser Asn Thr Ile Ser His Ala Pro Glu Lys Glu Trp Ile  
1405 1410 1415 1420

guc cgu ggu ggu guu gga uca gga aaa ucu acu ggu cua cca uuc gcg 4443  
Val Arg Gly Gly Val Gly Ser Gly Lys Ser Thr Gly Leu Pro Phe Ala  
1425 1430 1435

uua ucu agu aaa ggc gca guu cuu aug cuc gaa cca aca aga cca uug 4491  
Leu Ser Ser Lys Gly Ala Val Leu Met Leu Glu Pro Thr Arg Pro Leu  
1440 1445 1450

gca gag aau guc uca cga cag uug aga caa cau ccc uuu uau gca aac 4539  
Ala Glu Asn Val Ser Arg Gln Leu Arg Gln His Pro Phe Tyr Ala Asn  
1455 1460 1465

ccc aca uug aga aug cga gga aug uca ucu uuu gga ucu agu aau aua 4587  
Pro Thr Leu Arg Met Arg Gly Met Ser Ser Phe Gly Ser Ser Asn Ile  
1470 1475 1480

ugu aua aug acu agu gga uuu gcu uuc aau uac uuu gca aau aau ccu 4635  
Cys Ile Met Thr Ser Gly Phe Ala Phe Asn Tyr Phe Ala Asn Asn Pro  
1485 1490 1495 1500

cua aaa uua agu gau uuu gaa uuu gug aua aua gau gag ugu cac guc 4683  
Leu Lys Leu Ser Asp Phe Glu Phe Val Ile Ile Asp Glu Cys His Val  
1505 1510 1515

cua gau agc aac gcu aug gca uuc gug ugu cuu cuc aaa gaa cac aac 4731

Leu Asp Ser Asn Ala Met Ala Phe Val Cys Leu Leu Lys Glu His Asn

1520

1525

1530

uau gau ggc aaa cua uug aaa gug uca gcc aca cca cag ggc cgu gaa 4779

Tyr Asp Gly Lys Leu Leu Lys Val Ser Ala Thr Pro Gln Gly Arg Glu

1535

1540

1545

ugu gaa uuc cac aca cag cau cca guu ucc auu cau aua gag gaa caa 4827

Cys Glu Phe His Thr Gln His Pro Val Ser Ile His Ile Glu Glu Gln

1550

1555

1560

cuu agu uuc caa gcu uuu ugu gaa gcu caa gga acu ggc ucu gca cga 4875

Leu Ser Phe Gln Ala Phe Cys Glu Ala Gln Gly Thr Gly Ser Ala Arg

1565

1570

1575

1580

gau gua auc aaU aag gga gac aac auu uua gug uau guu gcu agu uac 4923

Asp Val Ile Asn Lys Gly Asp Asn Ile Leu Val Tyr Val Ala Ser Tyr

1585

1590

1595

aaU gag guu gau cag cuc uca aaa aug cuc gga gau aaa ggc uau uua 4971

Asn Glu Val Asp Gln Leu Ser Lys Met Leu Gly Asp Lys Gly Tyr Leu

1600

1605

1610

gug acu aaa guc gau ggg cgu acc aug aaa auu ggu ucg acc gac aua 5019

Val Thr Lys Val Asp Gly Arg Thr Met Lys Ile Gly Ser Thr Asp Ile

1615

1620

1625

guu acu aaa ggg agu agc cag aag aaa cau uuc auu gua gca acc aac 5067



Val Thr Lys Gly Ser Ser Gln Lys Lys His Phe Ile Val Ala Thr Asn  
 1630 1635 1640

aua auc gag aau gga guc acu cua gau gua gau guu guu gug gac uuu 5115  
 Ile Ile Glu Asn Gly Val Thr Leu Asp Val Asp Val Val Val Asp Phe  
 1645 1650 1655 1660

ggc uug aaa guc acu gcu gaa auu gau uac gac aac cgg ugc guu aau 5163  
 Gly Leu Lys Val Thr Ala Glu Ile Asp Tyr Asp Asn Arg Cys Val Asn  
 1665 1670 1675

uac aca aag acc agc auu uca uac gga gaa cgc aua caa aga uug ggc 5211  
 Tyr Thr Lys Thr Ser Ile Ser Tyr Gly Glu Arg Ile Gln Arg Leu Gly  
 1680 1685 1690

agg guu ggu aga cac aag aaa ggg cau gca aug aga auu gga acu aca 5259  
 Arg Val Gly Arg His Lys Lys Gly His Ala Met Arg Ile Gly Thr Thr  
 1695 1700 1705

auu aaa gga uug auu gag auu ccu agu cuu gug gcg aca cag gcu gca 5307  
 Ile Lys Gly Leu Ile Glu Ile Pro Ser Leu Val Ala Thr Gln Ala Ala  
 1710 1715 1720

uuu caa ugc uuc aca uau gga uug ccu gua aug aca caa gga guu uca 5355  
 Phe Gln Cys Phe Thr Tyr Gly Leu Pro Val Met Thr Gln Gly Val Ser  
 1725 1730 1735 1740

guu aac agu uua uca aau ugc aca guc cga cag gcc aga guu aug ucu 5403

Val Asn Ser Leu Ser Asn Cys Thr Val Arg Gln Ala Arg Val Met Ser

1745

1750

1755

cgu uuu gag uug ccg ccu uac uuu aug gcu uca cuu gua uau cau gau 5451

Arg Phe Glu Leu Pro Pro Tyr Phe Met Ala Ser Leu Val Tyr His Asp

1760

1765

1770

ggc agc aug cac ccu gaa auu cac aag cau uua auu ccu uac aag uua 5499

Gly Ser Met His Pro Glu Ile His Lys His Leu Ile Pro Tyr Lys Leu

1775

1780

1785

gau gaa ucu gaa auu caa cuu agu gcc aug gcu uuu aac uuu acc gua 5547

Asp Glu Ser Glu Ile Gln Leu Ser Ala Met Ala Phe Asn Phe Thr Val

1790

1795

1800

aca ucu auu ugg cua gau ugu aaa uuu uau gac agu aua gga auc cau 5595

Thr Ser Ile Trp Leu Asp Cys Lys Phe Tyr Asp Ser Ile Gly Ile His

1805

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1820

cuu gau uua ccg cgc gaa gca aaa auu cca uuc cau ugu aga gaa uuc 5643

Leu Asp Leu Pro Arg Glu Ala Lys Ile Pro Phe His Cys Arg Glu Phe

1825

1830

1835

cca gau aug aaa uac cga cac uug ugg gaa gau auu cuc aaa auc aag 5691

Pro Asp Met Lys Tyr Arg His Leu Trp Glu Asp Ile Leu Lys Ile Lys

1840

1845

1850

agc aua aaU ugu uuu ggu aga aug agu guu guu agc gca aca aaa gua 5739

Ser Ile Asn Cys Phe Gly Arg Met Ser Val Val Ser Ala Thr Lys Val

1855

1860

1865

gca uau aca cuu aaa aca gac auu cau uca auu gga aaa acu cuc gga 5787

Ala Tyr Thr Leu Lys Thr Asp Ile His Ser Ile Gly Lys Thr Leu Gly

1870

1875

1880

uau auu gac gcc cuc uug caa gaa gaa uau aga aaa cag cau cau uuu 5835

Tyr Ile Asp Ala Leu Leu Gln Glu Glu Tyr Arg Lys Gln His His Phe

1885

1890

1895

1900

aaa gca aug aca agu aac gca ugu agu ggg aac acu uuu uca aug cua 5883

Lys Ala Met Thr Ser Asn Ala Cys Ser Gly Asn Thr Phe Ser Met Leu

1905

1910

1915

agc aua gca aaU gca aua cgg aac cac uau gcu aag gac uac acu gcu 5931

Ser Ile Ala Asn Ala Ile Arg Asn His Tyr Ala Lys Asp Tyr Thr Ala

1920

1925

1930

ggc aaU auu cag aaa uug cag gca gca aag aaU caa aua cug gaa uuc 5979

Gly Asn Ile Gln Lys Leu Gln Ala Ala Lys Asn Gln Ile Leu Glu Phe

1935

1940

1945

guc aaU uua aaU cuu gau ccu ucg gcg aaa ugc gga uuc caa gag uuc 6027

Val Asn Leu Asn Leu Asp Pro Ser Ala Lys Cys Gly Phe Gln Glu Phe

1950

1955

1960

gga gcu uua gaa cua guu acc cau cag agc agg caa gaa auu uca aaa 6075

Gly Ala Leu Glu Leu Val Thr His Gln Ser Arg Gln Glu Ile Ser Lys  
1965 1970 1975 1980

uuu cua aaU cug aga ggu aag ugg aaU aag uca cua auu aca cgu gau 6123  
Phe Leu Asn Leu Arg Gly Lys Trp Asn Lys Ser Leu Ile Thr Arg Asp  
1985 1990 1995

auc uua guu uug uua ggu guc acu auu ggu ggu uuc ugg aug aua ugg 6171  
Ile Leu Val Leu Leu Gly Val Thr Ile Gly Gly Phe Trp Met Ile Trp  
2000 2005 2010

gau aag uuc aaa uca aac auu gaa gaa guu cau cau gaa gga aag agg 6219  
Asp Lys Phe Lys Ser Asn Ile Glu Glu Val His His Glu Gly Lys Arg  
2015 2020 2025

aag acu caa aag cuu aaa uuu cgg gau gcu cgc gau aag aaa aug ggu 6267  
Lys Thr Gln Lys Leu Lys Phe Arg Asp Ala Arg Asp Lys Lys Met Gly  
2030 2035 2040

cga gaa gua uau gga gac gac ggu acu auu gaa cau uac uuu gga ucg 6315  
Arg Glu Val Tyr Gly Asp Asp Gly Thr Ile Glu His Tyr Phe Gly Ser  
2045 2050 2055 2060

gca uac guc aag aga ggu gca guu aag ggc cag aag aga gga aug ggc 6363  
Ala Tyr Val Lys Arg Gly Ala Val Lys Gly Gln Lys Arg Gly Met Gly  
2065 2070 2075

gaa aaa uca aga cgu uuc guu agu aug uau gga guu aaU uua gaa gau 6411

Glu Lys Ser Arg Arg Phe Val Ser Met Tyr Gly Val Asn Leu Glu Asp

2080

2085

2090

uuu gcu uuu auu aga uac aua gau ccc aua acu gga gca acg cgu gau 6459

Phe Ala Phe Ile Arg Tyr Ile Asp Pro Ile Thr Gly Ala Thr Arg Asp

2095

2100

2105

gag agu ccu uug aca gau gug gaa uua gug caa gcu cau uuc gga gaa 6507

Glu Ser Pro Leu Thr Asp Val Glu Leu Val Gln Ala His Phe Gly Glu

2110

2115

2120

auc aga gac aaa aug cua gac gag ggc cuc auc gau agg caa cac auc 6555

Ile Arg Asp Lys Met Leu Asp Glu Gly Leu Ile Asp Arg Gln His Ile

2125

2130

2135

2140

uua aaU aaa cca ggu uug aca gca uac uua guu aag gac ggg guu aag 6603

Leu Asn Lys Pro Gly Leu Thr Ala Tyr Leu Val Lys Asp Gly Val Lys

2145

2150

2155

ucc auc aug aaa gua gau uug caa cca cac aaU ccu cua cuc aua ugc 6651

Ser Ile Met Lys Val Asp Leu Gln Pro His Asn Pro Leu Leu Ile Cys

2160

2165

2170

aaa aac aaa gcg aca aua gca ggg uuU ccu gag aag gag uuU guu uug 6699

Lys Asn Lys Ala Thr Ile Ala Gly Phe Pro Glu Lys Glu Phe Val Leu

2175

2180

2185

cga caa acg gac aaa gca uau gaa gua agu aga gag gaa cua cca gaa 6747

Arg Gln Thr Asp Lys Ala Tyr Glu Val Ser Arg Glu Glu Leu Pro Glu

2190

2195

2200

cgg aau gaa gac guu ucu uuu gaa gga gcc uca agu gug aag gga uug 6795

Arg Asn Glu Asp Val Ser Phe Glu Gly Ala Ser Ser Val Lys Gly Leu

2205

2210

2215

2220

cgc gau uac aau ggu gua gcc agc gcu auu ugc caa cuc aca aac aac 6843

Arg Asp Tyr Asn Gly Val Ala Ser Ala Ile Cys Gln Leu Thr Asn Asn

2225

2230

2235

uca aau ggu cgg ucc acc aca acu uau ggg guu ggc uuu ggc uca uac 6891

Ser Asn Gly Arg Ser Thr Thr Thr Tyr Gly Val Gly Phe Gly Ser Tyr

2240

2245

2250

auc aua guu aau agg cac uug uuu aaa gaa aau aau ggg aau uua uug 6939

Ile Ile Val Asn Arg His Leu Phe Lys Glu Asn Asn Gly Asn Leu Leu

2255

2260

2265

auc aaa ucg acg cau gga aau uuc aau auc agg aac ucc aag caa auu 6987

Ile Lys Ser Thr His Gly Asn Phe Asn Ile Arg Asn Ser Lys Gln Ile

2270

2275

2280

aaa guc guc gga gug gag gau agg gau auu gcc auu cuu caa aug ccu 7035

Lys Val Val Gly Val Glu Asp Arg Asp Ile Ala Ile Leu Gln Met Pro

2285

2290

2295

2300

aaa gac uuc cca ccc uuu gca cag agg uua cga uuu aga aau cca aua 7083

Lys Asp Phe Pro Pro Phe Ala Gln Arg Leu Arg Phe Arg Asn Pro Ile

2305

2310

2315

gug ggu gaa uca auu ugu cuu guu gga aaU acg uuc caa gaa aag uac 7131

Val Gly Glu Ser Ile Cys Leu Val Gly Asn Thr Phe Gln Glu Lys Tyr

2320

2325

2330

aaU gca agc auc guu ucu gag aca agc aaa aca uuc cca cga guu gaa 7179

Asn Ala Ser Ile Val Ser Glu Thr Ser Lys Thr Phe Pro Arg Val Glu

2335

2340

2345

ggU agu uuU ugg aaa cau ugg auu aaU aca acg gaa gga cau ugu gga 7227

Gly Ser Phe Trp Lys His Trp Ile Asn Thr Thr Glu Gly His Cys Gly

2350

2355

2360

uug ccU uuA guU agu guc acU gau gga uuU auU guA gga auA cau agu 7275

Leu Pro Leu Val Ser Val Thr Asp Gly Phe Ile Val Gly Ile His Ser

2365

2370

2375

2380

uuA aug agu cau aag uac gau cau aaU uau uuc ucg aac uuU gac gac 7323

Leu Met Ser His Lys Tyr Asp His Asn Tyr Phe Ser Asn Phe Asp Asp

2385

2390

2395

gcg uuU gaa ggc gau uau auU aac aag uug aag gaa cug aaa ugg gag 7371

Ala Phe Glu Gly Asp Tyr Ile Asn Lys Leu Lys Glu Leu Lys Trp Glu

2400

2405

2410

cag aaU ugg acU uac aac guU aaU acU guU agu ugg ggc aac aug aaa 7419

Gln Asn Trp Thr Tyr Asn Val Asn Thr Val Ser Trp Gly Asn Met Lys

2415

2420

2425

cuu cag gau agu gcu cca ugc aaa gaa uuc aaa aca acu aag uug auu 7467

Leu Gln Asp Ser Ala Pro Cys Lys Glu Phe Lys Thr Thr Lys Leu Ile

2430

2435

2440

agc gac uua ugc acg gaa ccu gug ugc gcu cag agu agc aa u caa guu 7515

Ser Asp Leu Cys Thr Glu Pro Val Cys Ala Gln Ser Ser Asn Gln Val

2445

2450

2455

2460

aga ugg uua uau aa u cag cuu gaa gga aa u uug aaa gcg guu gca acu 7563

Arg Trp Leu Tyr Asn Gln Leu Glu Gly Asn Leu Lys Ala Val Ala Thr

2465

2470

2475

auu ccc aa u aac uu u guu aca aag cac auu gug aaa gga cga ugu aaa 7611

Ile Pro Asn Asn Phe Val Thr Lys His Ile Val Lys Gly Arg Cys Lys

2480

2485

2490

uug uu u gaa uug uau cug caa acu cgu agu gaa gcg aa u gag uuc uu u 7659

Leu Phe Glu Leu Tyr Leu Gln Thr Arg Ser Glu Ala Asn Glu Phe Phe

2495

2500

2505

aaa cca cug aug ggu uuc uau ggg aag agc ggu cuc aac aag gaa gca 7707

Lys Pro Leu Met Gly Phe Tyr Gly Lys Ser Gly Leu Asn Lys Glu Ala

2510

2515

2520

uac auu aag gac cua uu u aaa uac uca uca gaa aua cca auu ggg gag 7755



Tyr Ile Lys Asp Leu Phe Lys Tyr Ser Ser Glu Ile Pro Ile Gly Glu

2525                      2530                      2535                      2540

guc gac acu gag aga uuu gaa gau gca guu ggg caa guc auc gaa auu 7803

Val Asp Thr Glu Arg Phe Glu Asp Ala Val Gly Gln Val Ile Glu Ile

2545                      2550                      2555

aug aug caa ugg aac uuu agg gaa ugc aag uau auc acc gau ugu gac 7851

Met Met Gln Trp Asn Phe Arg Glu Cys Lys Tyr Ile Thr Asp Cys Asp

2560                      2565                      2570

cag auc uuu gaa uca uug aac aug aaa gcg gca guc ggu gcg uug uac 7899

Gln Ile Phe Glu Ser Leu Asn Met Lys Ala Ala Val Gly Ala Leu Tyr

2575                      2580                      2585

agu ggu aag aaa aag gcg uac uuc gaa aaU ucc aca uuu gau gau cga 7947

Ser Gly Lys Lys Lys Ala Tyr Phe Glu Asn Ser Thr Phe Asp Asp Arg

2590                      2595                      2600

aaU cau uug cua cag cuu agu ugu cuc cga uua uuc aag ggu gau uug 7995

Asn His Leu Leu Gln Leu Ser Cys Leu Arg Leu Phe Lys Gly Asp Leu

2605                      2610                      2615                      2620

gga auu ugg aaU gga agu cuu aaa gcU gaa uua aga cca auu gaa aag 8043

Gly Ile Trp Asn Gly Ser Leu Lys Ala Glu Leu Arg Pro Ile Glu Lys

2625                      2630                      2635

guu gaa gca aac aaa acg cga aca uuc aca gca gcU cca auu gaa acu 8091

Val Glu Ala Asn Lys Thr Arg Thr Phe Thr Ala Ala Pro Ile Glu Thr

2640

2645

2650

uua cuu ggc gga aag guu ugc guc gau gau uuc aac aac caa uuu uau 8139

Leu Leu Gly Gly Lys Val Cys Val Asp Asp Phe Asn Asn Gln Phe Tyr

2655

2660

2665

gau cuu aaU aug aaa ugc cca ugg aca guc ggg aug acu aag uuu uau 8187

Asp Leu Asn Met Lys Cys Pro Trp Thr Val Gly Met Thr Lys Phe Tyr

2670

2675

2680

ugc gga ugg aaU gau cuu cua ggu aaa cuu ccu gau ggu ugg aua uac 8235

Cys Gly Trp Asn Asp Leu Leu Gly Lys Leu Pro Asp Gly Trp Ile Tyr

2685

2690

2695

2700

cgc gau gcu gac gga uca cga uuu gac agu ucu cuu aca cca uac uug 8283

Arg Asp Ala Asp Gly Ser Arg Phe Asp Ser Ser Leu Thr Pro Tyr Leu

2705

2710

2715

cug aaU gca gug cuc ggg aaU agg gag uuu uuc aug gaa gau ugg gac 8331

Leu Asn Ala Val Leu Gly Ile Arg Glu Phe Phe Met Glu Asp Trp Asp

2720

2725

2730

aua ggc gug cag aug cuu cga aaU uug cac acu gaa aua aaU uac acc 8379

Ile Gly Val Gln Met Leu Arg Asn Leu His Thr Glu Ile Ile Tyr Thr

2735

2740

2745

ccc aaU gca aca ccu gau gga aca guc guc aaa aag uuu cga gga aaU 8427

Pro Ile Ala Thr Pro Asp Gly Thr Val Val Lys Lys Phe Arg Gly Asn

2750

2755

2760

aaU agu ggu caa ccg uca aca guc gua gau aac aca uug aug guc ugu 8475

Asn Ser Gly Gln Pro Ser Thr Val Val Asp Asn Thr Leu Met Val Cys

2765

2770

2775

2780

auu ugu gug cag uau agu uua auu aug aaU agu gua aag uuU gag aaU 8523

Ile Cys Val Gln Tyr Ser Leu Ile Met Asn Ser Val Lys Phe Glu Asn

2785

2790

2795

cag gau gau guc ugc agg uau uuc guu aac ggu gau gau uua uug cuu 8571

Gln Asp Asp Val Cys Arg Tyr Phe Val Asn Gly Asp Asp Leu Leu Leu

2800

2805

2810

gca auc aaU cca aaa uuU aua cac auc cua gau ucu uuU aaa guu cau 8619

Ala Ile Asn Pro Lys Phe Ile His Ile Leu Asp Ser Phe Lys Val His

2815

2820

2825

uuU gcu aaU uua ggu uua gac uac gau uuc ucu cau cga acg aaa gac 8667

Phe Ala Asn Leu Gly Leu Asp Tyr Asp Phe Ser His Arg Thr Lys Asp

2830

2835

2840

aaa gga gaa cuu ugg uuU aug ucu cac aaa gga guu aaa uua aaU gac 8715

Lys Gly Glu Leu Trp Phe Met Ser His Lys Gly Val Lys Leu Asn Asp

2845

2850

2855

2860

aug uau auu cca aag cug gag cca gag agg guu guc uca aua cuu gag 8763

Met Tyr Ile Pro Lys Leu Glu Pro Glu Arg Val Val Ser Ile Leu Glu

2865

2870

2875

ugg gau aga agu gua aaa cca gaa cac aga uua gaa gcg auu ugc gcu 8811

Trp Asp Arg Ser Val Lys Pro Glu His Arg Leu Glu Ala Ile Cys Ala

2880

2885

2890

ucg aug auu gaa gca ugg ggu uac ccu agg uua auc cac gaa auu cga 8859

Ser Met Ile Glu Ala Trp Gly Tyr Pro Arg Leu Ile His Glu Ile Arg

2895

2900

2905

aaa uuu uau gcu ugg guu cug gaa caa gca cca uac aaU cau cuc gca 8907

Lys Phe Tyr Ala Trp Val Leu Glu Gln Ala Pro Tyr Asn His Leu Ala

2910

2915

2920

ucu gag gga aag gca cca uac auu ucg gaa aca gcg cuc aaa aga cuu 8955

Ser Glu Gly Lys Ala Pro Tyr Ile Ser Glu Thr Ala Leu Lys Arg Leu

2925

2930

2935

2940

uac aca ugc gaa gaa gga agu gcu gau gaa auc aug uca uac uua gag 9003

Tyr Thr Cys Glu Glu Gly Ser Ala Asp Glu Ile Met Ser Tyr Leu Glu

2945

2950

2955

aug ugu gca agu gau uug aac gag gau gag uac uuu gau gau gaa gau 9051

Met Cys Ala Ser Asp Leu Asn Glu Asp Glu Tyr Phe Asp Asp Glu Asp

2960

2965

2970

guu ucu cac cag ucc gcu cuu gau gcu ggc aaa ccc aca gca gaa aac 9099

Val Ser His Gln Ser Ala Leu Asp Ala Gly Lys Pro Thr Ala Glu Asn

2975

2980

2985

aag aaa gac gau gaa gag aga aag aaU aaa gaa gaa aag cag gaa aaU 9147

Lys Lys Asp Asp Glu Glu Arg Lys Asn Lys Glu Glu Lys Gln Glu Asn

2990

2995

3000

aaa aac aaa aaU aaa gaa guc gag aag aaa cau gag aaa acu ucg aaU 9195

Lys Asn Lys Asn Lys Glu Val Glu Lys Lys His Glu Lys Thr Ser Asn

3005

3010

3015

3020

agc gca ucu ggu gcu aaU guU uca aac aac gaa aaa gac aag gau guc 9243

Ser Ala Ser Gly Ala Ile Val Ser Asn Asn Glu Lys Asp Lys Asp Val

3025

3030

3035

gau gua gga uca agu gga ucu uuc auc aua cca cga aaU aaa ucg aua 9291

Asp Val Gly Ser Ser Gly Ser Phe Ile Ile Pro Arg Ile Lys Ser Ile

3040

3045

3050

ucc aaU aaa cuc aca aug cca aaa gug aaa ggg aaa gga aaU uua aaU 9339

Ser Asn Lys Leu Thr Met Pro Lys Val Lys Gly Lys Gly Ile Leu Asn

3055

3060

3065

uug gag uuc cuU uua caa uac aca cca gau caa gug gac aaU uca aaU 9387

Leu Glu Phe Leu Leu Gln Tyr Thr Pro Asp Gln Val Asp Ile Ser Asn

3070

3075

3080

acc agg gca agu aaU uca cag uuU aaU aca ugg uac aac gcu gug aag 9435

Thr Arg Ala Ser Ile Ser Gln Phe Asn Thr Trp Tyr Asn Ala Val Lys  
3085 3090 3095 3100

gaa ucc uau ggu gug ucu gau gaa gaa aug gga aua auu uug aaU gga 9483  
Glu Ser Tyr Gly Val Ser Asp Glu Glu Met Gly Ile Ile Leu Asn Gly  
3105 3110 3115

uua aug guu ugg ugu auu gaa aaU gga aca ucu cca aac auu aaU ggc 9531  
Leu Met Val Trp Cys Ile Glu Asn Gly Thr Ser Pro Asn Ile Asn Gly  
3120 3125 3130

aug ugg uuU aug aug caa ggg gaa gaa caa auc gaa uac ccc cuu caa 9579  
Met Trp Phe Met Met Gln Gly Glu Glu Gln Ile Glu Tyr Pro Leu Gln  
3135 3140 3145

cca aua gug gaa aac gca aaa ccc acu uug cgu cag auu aug gcu cac 9627  
Pro Ile Val Glu Asn Ala Lys Pro Thr Leu Arg Gln Ile Met Ala His  
3150 3155 3160

uuu agc aaU guu gcu gaa gca uac auc gaa aag aga aaU uau gag aag 9675  
Phe Ser Asn Val Ala Glu Ala Tyr Ile Glu Lys Arg Asn Tyr Glu Lys  
3165 3170 3175 3180

cca uau aug ccg agg uac ggu auu caa cgg aac cuc acc gac aug agu 9723  
Pro Tyr Met Pro Arg Tyr Gly Ile Gln Arg Asn Leu Thr Asp Met Ser  
3185 3190 3195

uug gcg cga uau gcu uuU gau uuc uau gaa aug aca uca agg acg cca 9771

Leu Ala Arg Tyr Ala Phe Asp Phe Tyr Glu Met Thr Ser Arg Thr Pro

3200

3205

3210

gcu cgg gcc cgg gaa gcc cac auc cag aug aaa gcu gca gca uug cga 9819

Ala Arg Ala Arg Glu Ala His Ile Gln Met Lys Ala Ala Ala Leu Arg

3215

3220

3225

gau gcg aaU aaU aag aug uuU gga cug gau gga aaa guc gga aaU gcg 9867

Asp Ala Asn Asn Lys Met Phe Gly Leu Asp Gly Lys Val Gly Asn Ala

3230

3235

3240

acu gag aac acg gag gcg cac acc gca gac gau guu aac cau aac acu 9915

Thr Glu Asn Thr Glu Arg His Thr Ala Asp Asp Val Asn His Asn Thr

3245

3250

3255

3260

cau gca uuc acc ggc guu cga uau uau uagauuuuu ccuaagcaua 9962

His Ala Phe Thr Gly Val Arg Tyr Tyr

3265

guuuuauca guaucuuuuu aaucgcauuu gcuuuacuuu cuagcacgcg uuagugaggu 10022

uuuaccuccu auuaucauag ugucagugag gguagcccuc gugugaucuc uuagaaagua 10082

uuuguccaag cugcaguggc ugguguuuca uagcaugagu ggcucaugga ccuucagccu 10142

aagcaaggag ggn

10155

<210> 2

<211> 3269

<212> PRT

<213> Papaya Leaf-Distortion Mosaic Virus

<400> 2

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1 5 10 15

Glu Gln Ile Glu Cys Val Arg Leu Val Pro Gly Thr Arg Val Glu Glu  
20 25 30

Val Lys Thr Ile Lys Lys Val Leu Lys Thr His Tyr Gln Glu Ile Thr  
35 40 45

Leu Gly Cys Thr Asp Arg Cys Ala Gly Leu Ser Ala Tyr Thr Lys Thr  
50 55 60

Ser Leu Lys Arg Ala Ile Lys Glu Lys Asp Leu Thr Ala Ser Gly Ser  
65 70 75 80

Cys Phe His Cys Gly Leu Arg Ala Gln Ile Gly Glu Gly Arg Lys Arg  
85 90 95

Val Glu Leu Ala Pro Ile Ser Val Met Glu Asp Val Glu Thr Val Glu  
100 105 110

Gln Val Leu Val Pro Cys Met Val Glu Glu Lys Tyr Tyr Lys Glu Val  
52

10075839.021502



115

120

125

Ser Asn Phe Gln Lys Ala Thr Leu Ile Asp Lys Pro Lys Leu Thr Ile

130

135

140

Ala Pro Val Leu Met Ala Gln Pro Ala Gln Val Pro Arg Pro Ala Val

145

150

155

160

Phe Asn Glu Ile Arg Lys Val His Glu Glu Met Lys Ser Gln Thr Ser

165

170

175

Glu Asn Lys Val Leu Glu Glu Glu Thr Gln Cys Ala Ser Asp Ala Ala

180

185

190

Leu His His Leu Asp Asp Val His Ala Cys Arg Ala Arg Ala Gln Val

195

200

205

Gly Ile Glu Arg Ile Leu Ala Arg His Ala Arg His Arg Ile Glu Ala

210

215

220

Arg Gln Gln Val Glu Glu Glu Gln Ser Glu Ala Leu Ala Ala Phe Glu

225

230

235

240

Ser Phe Phe Asn Gln Thr His Arg Glu Asp Arg Tyr Glu Gly Lys Val

245

250

255

Leu Thr Ile Arg Asn Gly Ile Thr Gly Trp Phe Glu Pro Asn Arg Asn

260

265

270

Asp Ile Lys Asn Ala Ala Arg Arg Arg Lys Arg Ala Asn Lys Lys Ile  
 275 280 285

Pro Phe Val Ala Arg Glu Asn Asp Val Ala Arg Ile Glu Thr His Glu  
 290 295 300

Pro Asn Val Lys Glu Glu Thr Lys Asp Val Glu Glu Ala Thr Asp Thr  
 305 310 315 320

Tyr Thr Phe Lys Lys Gln Arg Asn Asp Lys Lys Arg Val Leu Lys Glu  
 325 330 335

Asn Val Ser Leu Ser Met Ala Arg Ile Asn Glu Leu Val Arg Cys Val  
 340 345 350

Thr Lys Leu Cys Arg Lys Asp Ser Lys Glu Leu Glu Phe Ile Gly Lys  
 355 360 365

Arg Gly Ser Leu Arg Val Gln Cys Thr Lys Asn Cys Gly Ser Arg Val  
 370 375 380

Ile Leu Arg His Leu Arg Gly Glu Leu Arg Arg Lys Asp Cys Tyr Trp  
 385 390 395 400

Asp Arg Ile Ile Glu Asn Phe Phe Glu Ile Ala Ala Ala Lys Leu Gln  
 405 410 415

Asn Lys Asn Leu Asn Asn Asn Glu Ser Val Arg Arg Gly His Ser Gly  
 420 425 430

His Ile Ile Gln Tyr Asp Lys Phe Arg Gly Leu Ser Gly Arg His Phe  
 435 440 445

Gly Ser Tyr Ile Ile Val Arg Gly Ser Met Asp Gly Arg Ile Ile Asp  
 450 455 460

Ala Arg Ser Lys Ile Thr His Ser Val Met Ile Asn Met Thr His Tyr  
 465 470 475 480

Ser Asp Ala Gly Leu Ser Phe Trp Lys Gly Phe Asp Arg Gln Phe Ile  
 485 490 495

Asp Ile Arg Asp Arg Pro Lys Asn Ala His Glu Cys Lys Ala Thr Ile  
 500 505 510

Asn Val Glu Glu Cys Gly Glu Met Ala Ala Ile Val Asn Gln Leu Leu  
 515 520 525

Phe Pro Met Trp Lys Ile Thr Cys Thr Gln Cys Gly Glu Leu Leu Glu  
 530 535 540

Met Leu Ser Gln Glu Glu Glu Leu Glu Ser Phe Arg Arg Lys Arg Ser  
 545 550 555 560

Gln Leu Ala Ser Lys Leu Ser Ser Leu His Ile Lys Phe Pro Tyr Val

565

570

575

Asp His Phe Leu Asn Arg Tyr Glu Asn Ser Leu Asn Arg Met Asn Thr

580

585

590

Asn Phe Asp Ala His Lys Gln Ile Ala Gln Ile Ile Gly Ser Arg Lys

595

600

605

Glu Ile Pro Phe Ser Asn Leu Glu His Leu Asn Glu Leu Leu Ile Lys

610

615

620

Ser Asp Lys Leu Val Ser Glu Asp Phe Tyr Glu Met Ser Gln Cys Leu

625

630

635

640

Leu Glu Leu Thr Arg Trp His Lys Asn Arg Ser Asp Ser Phe Lys Lys

645

650

655

Gly Glu Ile His His Phe Arg Asn Lys Met Ser Gly Lys Ala Gln Phe

660

665

670

Asn Phe Ala Leu Met Cys Asp Asn Gln Leu Asp Lys Asn Gly Asn Phe

675

680

685

Val Trp Gly Glu Arg Gly Tyr His Ala Lys Arg Phe Phe Leu Asn Phe

690

695

700

Phe Glu Lys Val Asp Ser Thr Asp Gly Tyr Lys Lys His Ile Met Arg

705

710

715

720

Val Asn Pro Asn Gly Thr Arg Gln Thr Ala Ile Gly Lys Leu Ile Leu  
725 730 735

Ser Thr Asp Pro Ser Thr Leu Arg Gln Gln Met Lys Gly Ser Pro Ile  
740 745 750

Thr Arg Val Pro Val Gly Lys Tyr Cys Thr Ser Lys Arg Asp Gly Cys  
755 760 765

Tyr Val Tyr Pro Ala Cys Cys Val Thr Met Glu Asp Gly Thr Pro Leu  
770 775 780

Phe Ser Asp Ile Lys Met Pro Thr Lys Asn His Leu Val Ile Gly Asn  
785 790 795 800

Ser Gly Asp Pro Lys Tyr Val Asp Val Pro Ser Ser Ser Ser Asp Met  
805 810 815

Ile Val Ala Lys Glu Gly Tyr Cys Tyr Leu Asn Ile Phe Leu Ala Met  
820 825 830

Leu Leu Asn Val Asn Glu Ser Glu Ser Lys Ser Phe Thr Lys Lys Val  
835 840 845

Arg Asp Ile Ile Val Pro Arg Leu Gly Gln Trp Pro Ser Leu Ile Asp  
850 855 860

Val Ala Thr Glu Cys Tyr Phe Leu Ser Ala Phe His Pro Glu Thr Lys  
865 870 875 880

Asn Ala Glu Leu Pro Arg Ile Leu Val Asp His Thr Ser Lys Cys Met  
885 890 895

His Val Ile Asp Ser Tyr Gly Ser Leu Asp Thr Gln Phe His Val Leu  
900 905 910

Lys Ala Asn Thr Val Ser Gln Leu Ile Lys Phe Ala Asp Asn Asp Leu  
915 920 925

Asp Ser Glu Leu Lys His Tyr Leu Val Gly Gly Asp Leu His Ser Lys  
930 935 940

Gln Ala Pro Gln Cys Ser Ile Lys Leu Leu Cys Lys Cys Ile Tyr Arg  
945 950 955 960

Pro Lys Leu Met Arg Gln Cys Ile Glu Glu Glu Pro Phe Leu Leu Ile  
965 970 975

Leu Ala Cys Ile Ser Pro Gly Val Leu Leu Ala Leu Tyr Asn Ser Gln  
980 985 990

His Leu Glu Leu Ala Leu Lys Tyr Trp Met Ser Lys Gln Gln Ser Val  
995 1000 1005

Ala Ala Leu Phe Ala Met Ile His Gly Leu Ala Ala Lys Val Thr Val

1010

1015

1020

Ala Gln Thr Leu Asn Glu Gln Arg Leu Ile Leu Glu Arg Gly Ala Arg

025

1030

1035

1040

Asn Leu Ile Ser Val Met Glu Thr Ile His Met Thr Ser His Ser Tyr

1045

1050

1055

Gln Pro Ala Leu Leu Gln Leu Gln Val Met Ala Asn Arg Arg Asp Met

1060

1065

1070

Asn Ser Thr Leu Asp Leu Ala Gly Phe Ser Ile Leu Gln Ser Glu Asp

1075

1080

1085

Ser Met Tyr Trp Met Glu Lys Ser Tyr Leu Met Glu Leu Glu Asp Ser

1090

1095

1100

Trp Asn Asp Leu Lys Trp Leu Glu Lys Leu Gln Glu Met Trp Arg Leu

105

1110

1115

1120

Ser Lys Tyr Ser Ile Ser Gly Ile Ser Gln Leu Ser Met Lys Gly Ala

1125

1130

1135

Thr Asp Leu Gly Gly Arg Tyr Ser Val Ser Ala Lys Gln Phe Ile Thr

1140

1145

1150

Ser Val Met Lys Pro Val Lys Lys Ser Cys Val Lys Ala Arg Asp Thr

1155

1160

1165

Cys Lys Glu Val Ile Ile Asn Thr Thr Ser Trp Thr Phe Arg Ala Thr  
 1170 1175 1180

Phe Ser Leu Cys Arg Trp Cys Leu Pro Asp Cys Leu Lys Phe Ile Asn  
 185 1190 1195 1200

Met Leu Ile Val Ile Ser Leu Ile Leu Ser Ile Trp His Ser Ala Asn  
 1205 1210 1215

Ser Ile Ser Phe Asp Tyr Ala Gln Met Lys Arg Glu Lys Gln Val Asn  
 1220 1225 1230

Ile Glu Lys Val Leu Met Asn Asn Leu Val Ala Leu His Lys Glu Gln  
 1235 1240 1245

Ile Lys Ile Asn Pro Asp Leu Thr Lys Glu Glu Phe Lys Glu Tyr Ile  
 1250 1255 1260

Ala Arg Ser Arg Pro Glu Leu Ile Ala Leu Val Asn Lys Glu Leu Gln  
 1265 1270 1275 1280

Glu Glu Val Asp His Gln Ala Lys Arg Lys Gly Glu Gln Asn Leu Glu  
 1285 1290 1295

Lys Ile Ile Ala Phe Val Ala Leu Val Met Met Ile Phe Asp Ser Glu  
 1300 1305 1310



Lys Ser Asp Cys Val Tyr Lys Thr Leu Asn Lys Leu Arg Asn Leu Val  
 1315 1320 1325

Ala Thr Cys Asp Glu Pro Val Ala His Gln Ser Leu Asp Asp Ile Gln  
 1330 1335 1340

Asp Ile Leu Thr Asp Lys Glu Thr Thr Ile Asp Phe Asp Leu Asp Cys  
 345 1350 1355 1360

Glu Gly Ser Lys Val Thr Glu Phe Lys Glu Met Asn Phe Ala Ala Trp  
 1365 1370 1375

Trp Glu Lys Gln Leu Gln Cys Asp Arg Val Val Pro His Tyr Arg Thr  
 1380 1385 1390

Thr Gly Lys Phe Ile Glu Phe Thr Arg Glu Ser Cys Val Ser Val Ser  
 1395 1400 1405

Asn Thr Ile Ser His Ala Pro Glu Lys Glu Trp Ile Val Arg Gly Gly  
 1410 1415 1420

Val Gly Ser Gly Lys Ser Thr Gly Leu Pro Phe Ala Leu Ser Ser Lys  
 425 1430 1435 1440

Gly Ala Val Leu Met Leu Glu Pro Thr Arg Pro Leu Ala Glu Asn Val  
 1445 1450 1455

Ser Arg Gln Leu Arg Gln His Pro Phe Tyr Ala Asn Pro Thr Leu Arg  
 61

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1460

1465

1470

Met Arg Gly Met Ser Ser Phe Gly Ser Ser Asn Ile Cys Ile Met Thr

1475

1480

1485

Ser Gly Phe Ala Phe Asn Tyr Phe Ala Asn Asn Pro Leu Lys Leu Ser

1490

1495

1500

Asp Phe Glu Phe Val Ile Ile Asp Glu Cys His Val Leu Asp Ser Asn

505

1510

1515

1520

Ala Met Ala Phe Val Cys Leu Leu Lys Glu His Asn Tyr Asp Gly Lys

1525

1530

1535

Leu Leu Lys Val Ser Ala Thr Pro Gln Gly Arg Glu Cys Glu Phe His

1540

1545

1550

Thr Gln His Pro Val Ser Ile His Ile Glu Glu Gln Leu Ser Phe Gln

1555

1560

1565

Ala Phe Cys Glu Ala Gln Gly Thr Gly Ser Ala Arg Asp Val Ile Asn

1570

1575

1580

Lys Gly Asp Asn Ile Leu Val Tyr Val Ala Ser Tyr Asn Glu Val Asp

585

1590

1595

1600

Gln Leu Ser Lys Met Leu Gly Asp Lys Gly Tyr Leu Val Thr Lys Val

1605

1610

1615

Asp Gly Arg Thr Met Lys Ile Gly Ser Thr Asp Ile Val Thr Lys Gly  
 1620 1625 1630

Ser Ser Gln Lys Lys His Phe Ile Val Ala Thr Asn Ile Ile Glu Asn  
 1635 1640 1645

Gly Val Thr Leu Asp Val Asp Val Val Val Asp Phe Gly Leu Lys Val  
 1650 1655 1660

Thr Ala Glu Ile Asp Tyr Asp Asn Arg Cys Val Asn Tyr Thr Lys Thr  
 665 1670 1675 1680

Ser Ile Ser Tyr Gly Glu Arg Ile Gln Arg Leu Gly Arg Val Gly Arg  
 1685 1690 1695

His Lys Lys Gly His Ala Met Arg Ile Gly Thr Thr Ile Lys Gly Leu  
 1700 1705 1710

Ile Glu Ile Pro Ser Leu Val Ala Thr Gln Ala Ala Phe Gln Cys Phe  
 1715 1720 1725

Thr Tyr Gly Leu Pro Val Met Thr Gln Gly Val Ser Val Asn Ser Leu  
 1730 1735 1740

Ser Asn Cys Thr Val Arg Gln Ala Arg Val Met Ser Arg Phe Glu Leu  
 745 1750 1755 1760



905                      1910                      1915                      1920

Ala Ile Arg Asn His Tyr Ala Lys Asp Tyr Thr Ala Gly Asn Ile Gln

1925                      1930                      1935

Lys Leu Gln Ala Ala Lys Asn Gln Ile Leu Glu Phe Val Asn Leu Asn

1940                      1945                      1950

Leu Asp Pro Ser Ala Lys Cys Gly Phe Gln Glu Phe Gly Ala Leu Glu

1955                      1960                      1965

Leu Val Thr His Gln Ser Arg Gln Glu Ile Ser Lys Phe Leu Asn Leu

1970                      1975                      1980

Arg Gly Lys Trp Asn Lys Ser Leu Ile Thr Arg Asp Ile Leu Val Leu

985                      1990                      1995                      2000

Leu Gly Val Thr Ile Gly Gly Phe Trp Met Ile Trp Asp Lys Phe Lys

2005                      2010                      2015

Ser Asn Ile Glu Glu Val His His Glu Gly Lys Arg Lys Thr Gln Lys

2020                      2025                      2030

Leu Lys Phe Arg Asp Ala Arg Asp Lys Lys Met Gly Arg Glu Val Tyr

2035                      2040                      2045

Gly Asp Asp Gly Thr Ile Glu His Tyr Phe Gly Ser Ala Tyr Val Lys

2050                      2055                      2060

Arg Gly Ala Val Lys Gly Gln Lys Arg Gly Met Gly Glu Lys Ser Arg  
065 2070 2075 2080

Arg Phe Val Ser Met Tyr Gly Val Asn Leu Glu Asp Phe Ala Phe Ile  
2085 2090 2095

Arg Tyr Ile Asp Pro Ile Thr Gly Ala Thr Arg Asp Glu Ser Pro Leu  
2100 2105 2110

Thr Asp Val Glu Leu Val Gln Ala His Phe Gly Glu Ile Arg Asp Lys  
2115 2120 2125

Met Leu Asp Glu Gly Leu Ile Asp Arg Gln His Ile Leu Asn Lys Pro  
2130 2135 2140

Gly Leu Thr Ala Tyr Leu Val Lys Asp Gly Val Lys Ser Ile Met Lys  
145 2150 2155 2160

Val Asp Leu Gln Pro His Asn Pro Leu Leu Ile Cys Lys Asn Lys Ala  
2165 2170 2175

Thr Ile Ala Gly Phe Pro Glu Lys Glu Phe Val Leu Arg Gln Thr Asp  
2180 2185 2190

Lys Ala Tyr Glu Val Ser Arg Glu Glu Leu Pro Glu Arg Asn Glu Asp  
2195 2200 2205

Val Ser Phe Glu Gly Ala Ser Ser Val Lys Gly Leu Arg Asp Tyr Asn  
 2210 2215 2220

Gly Val Ala Ser Ala Ile Cys Gln Leu Thr Asn Asn Ser Asn Gly Arg  
 2225 2230 2235 2240

Ser Thr Thr Thr Tyr Gly Val Gly Phe Gly Ser Tyr Ile Ile Val Asn  
 2245 2250 2255

Arg His Leu Phe Lys Glu Asn Asn Gly Asn Leu Leu Ile Lys Ser Thr  
 2260 2265 2270

His Gly Asn Phe Asn Ile Arg Asn Ser Lys Gln Ile Lys Val Val Gly  
 2275 2280 2285

Val Glu Asp Arg Asp Ile Ala Ile Leu Gln Met Pro Lys Asp Phe Pro  
 2290 2295 2300

Pro Phe Ala Gln Arg Leu Arg Phe Arg Asn Pro Ile Val Gly Glu Ser  
 2305 2310 2315 2320

Ile Cys Leu Val Gly Asn Thr Phe Gln Glu Lys Tyr Asn Ala Ser Ile  
 2325 2330 2335

Val Ser Glu Thr Ser Lys Thr Phe Pro Arg Val Glu Gly Ser Phe Trp  
 2340 2345 2350

Lys His Trp Ile Asn Thr Thr Glu Gly His Cys Gly Leu Pro Leu Val

2355

2360

2365

Ser Val Thr Asp Gly Phe Ile Val Gly Ile His Ser Leu Met Ser His

2370

2375

2380

Lys Tyr Asp His Asn Tyr Phe Ser Asn Phe Asp Asp Ala Phe Glu Gly

385

2390

2395

2400

Asp Tyr Ile Asn Lys Leu Lys Glu Leu Lys Trp Glu Gln Asn Trp Thr

2405

2410

2415

Tyr Asn Val Asn Thr Val Ser Trp Gly Asn Met Lys Leu Gln Asp Ser

2420

2425

2430

Ala Pro Cys Lys Glu Phe Lys Thr Thr Lys Leu Ile Ser Asp Leu Cys

2435

2440

2445

Thr Glu Pro Val Cys Ala Gln Ser Ser Asn Gln Val Arg Trp Leu Tyr

2450

2455

2460

Asn Gln Leu Glu Gly Asn Leu Lys Ala Val Ala Thr Ile Pro Asn Asn

465

2470

2475

2480

Phe Val Thr Lys His Ile Val Lys Gly Arg Cys Lys Leu Phe Glu Leu

2485

2490

2495

Tyr Leu Gln Thr Arg Ser Glu Ala Asn Glu Phe Phe Lys Pro Leu Met

2500

2505

2510



Gly Phe Tyr Gly Lys Ser Gly Leu Asn Lys Glu Ala Tyr Ile Lys Asp

2515

2520

2525

Leu Phe Lys Tyr Ser Ser Glu Ile Pro Ile Gly Glu Val Asp Thr Glu

2530

2535

2540

Arg Phe Glu Asp Ala Val Gly Gln Val Ile Glu Ile Met Met Gln Trp

545

2550

2555

2560

Asn Phe Arg Glu Cys Lys Tyr Ile Thr Asp Cys Asp Gln Ile Phe Glu

2565

2570

2575

Ser Leu Asn Met Lys Ala Ala Val Gly Ala Leu Tyr Ser Gly Lys Lys

2580

2585

2590

Lys Ala Tyr Phe Glu Asn Ser Thr Phe Asp Asp Arg Asn His Leu Leu

2595

2600

2605

Gln Leu Ser Cys Leu Arg Leu Phe Lys Gly Asp Leu Gly Ile Trp Asn

2610

2615

2620

Gly Ser Leu Lys Ala Glu Leu Arg Pro Ile Glu Lys Val Glu Ala Asn

625

2630

2635

2640

Lys Thr Arg Thr Phe Thr Ala Ala Pro Ile Glu Thr Leu Leu Gly Gly

2645

2650

2655

Lys Val Cys Val Asp Asp Phe Asn Asn Gln Phe Tyr Asp Leu Asn Met  
 2660 2665 2670

Lys Cys Pro Trp Thr Val Gly Met Thr Lys Phe Tyr Cys Gly Trp Asn  
 2675 2680 2685

Asp Leu Leu Gly Lys Leu Pro Asp Gly Trp Ile Tyr Arg Asp Ala Asp  
 2690 2695 2700

Gly Ser Arg Phe Asp Ser Ser Leu Thr Pro Tyr Leu Leu Asn Ala Val  
 705 2710 2715 2720

Leu Gly Ile Arg Glu Phe Phe Met Glu Asp Trp Asp Ile Gly Val Gln  
 2725 2730 2735

Met Leu Arg Asn Leu His Thr Glu Ile Ile Tyr Thr Pro Ile Ala Thr  
 2740 2745 2750

Pro Asp Gly Thr Val Val Lys Lys Phe Arg Gly Asn Asn Ser Gly Gln  
 2755 2760 2765

Pro Ser Thr Val Val Asp Asn Thr Leu Met Val Cys Ile Cys Val Gln  
 2770 2775 2780

Tyr Ser Leu Ile Met Asn Ser Val Lys Phe Glu Asn Gln Asp Asp Val  
 785 2790 2795 2800

Cys Arg Tyr Phe Val Asn Gly Asp Asp Leu Leu Leu Ala Ile Asn Pro

2805

2810

2815

Lys Phe Ile His Ile Leu Asp Ser Phe Lys Val His Phe Ala Asn Leu

2820

2825

2830

Gly Leu Asp Tyr Asp Phe Ser His Arg Thr Lys Asp Lys Gly Glu Leu

2835

2840

2845

Trp Phe Met Ser His Lys Gly Val Lys Leu Asn Asp Met Tyr Ile Pro

2850

2855

2860

Lys Leu Glu Pro Glu Arg Val Val Ser Ile Leu Glu Trp Asp Arg Ser

865

2870

2875

2880

Val Lys Pro Glu His Arg Leu Glu Ala Ile Cys Ala Ser Met Ile Glu

2885

2890

2895

Ala Trp Gly Tyr Pro Arg Leu Ile His Glu Ile Arg Lys Phe Tyr Ala

2900

2905

2910

Trp Val Leu Glu Gln Ala Pro Tyr Asn His Leu Ala Ser Glu Gly Lys

2915

2920

2925

Ala Pro Tyr Ile Ser Glu Thr Ala Leu Lys Arg Leu Tyr Thr Cys Glu

2930

2935

2940

Glu Gly Ser Ala Asp Glu Ile Met Ser Tyr Leu Glu Met Cys Ala Ser

945

2950

2955

2960

Asp Leu Asn Glu Asp Glu Tyr Phe Asp Asp Glu Asp Val Ser His Gln  
 2965 2970 2975

Ser Ala Leu Asp Ala Gly Lys Pro Thr Ala Glu Asn Lys Lys Asp Asp  
 2980 2985 2990

Glu Glu Arg Lys Asn Lys Glu Glu Lys Gln Glu Asn Lys Asn Lys Asn  
 2995 3000 3005

Lys Glu Val Glu Lys Lys His Glu Lys Thr Ser Asn Ser Ala Ser Gly  
 3010 3015 3020

Ala Ile Val Ser Asn Asn Glu Lys Asp Lys Asp Val Asp Val Gly Ser  
 025 3030 3035 3040

Ser Gly Ser Phe Ile Ile Pro Arg Ile Lys Ser Ile Ser Asn Lys Leu  
 3045 3050 3055

Thr Met Pro Lys Val Lys Gly Lys Gly Ile Leu Asn Leu Glu Phe Leu  
 3060 3065 3070

Leu Gln Tyr Thr Pro Asp Gln Val Asp Ile Ser Asn Thr Arg Ala Ser  
 3075 3080 3085

Ile Ser Gln Phe Asn Thr Trp Tyr Asn Ala Val Lys Glu Ser Tyr Gly  
 3090 3095 3100

Val Ser Asp Glu Glu Met Gly Ile Ile Leu Asn Gly Leu Met Val Trp  
105                      3110                      3115                      3120

Cys Ile Glu Asn Gly Thr Ser Pro Asn Ile Asn Gly Met Trp Phe Met  
                         3125                      3130                      3135

Met Gln Gly Glu Glu Gln Ile Glu Tyr Pro Leu Gln Pro Ile Val Glu  
                         3140                      3145                      3150

Asn Ala Lys Pro Thr Leu Arg Gln Ile Met Ala His Phe Ser Asn Val  
                         3155                      3160                      3165

Ala Glu Ala Tyr Ile Glu Lys Arg Asn Tyr Glu Lys Pro Tyr Met Pro  
                         3170                      3175                      3180

Arg Tyr Gly Ile Gln Arg Asn Leu Thr Asp Met Ser Leu Ala Arg Tyr  
185                      3190                      3195                      3200

Ala Phe Asp Phe Tyr Glu Met Thr Ser Arg Thr Pro Ala Arg Ala Arg  
                         3205                      3210                      3215

Glu Ala His Ile Gln Met Lys Ala Ala Ala Leu Arg Asp Ala Asn Asn  
                         3220                      3225                      3230

Lys Met Phe Gly Leu Asp Gly Lys Val Gly Asn Ala Thr Glu Asn Thr  
                         3235                      3240                      3245

Glu Arg His Thr Ala Asp Asp Val Asn His Asn Thr His Ala Phe Thr

3250

3255

3260

Gly Val Arg Tyr Tyr

3265

&lt;210&gt; 3

&lt;211&gt; 729

&lt;212&gt; DNA

&lt;213&gt; Papaya Leaf-Distortion Mosaic Virus

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1).. (729)

&lt;400&gt; 3

gga gcc tca agt gtg aag gga ttg cgc gat tac aat ggt gta gcc agc 48

Gly Ala Ser Ser Val Lys Gly Leu Arg Asp Tyr Asn Gly Val Ala Ser

1

5

10

15

gct att tgc caa ctc aca aac aac tca aat ggt cgg tcc acc aca act 96

Ala Ile Cys Gln Leu Thr Asn Asn Ser Asn Gly Arg Ser Thr Thr Thr

20

25

30

tat ggg gtt ggc ttt ggc tca tac atc ata gtt aat agg cac ttg ttt 144

Tyr Gly Val Gly Phe Gly Ser Tyr Ile Ile Val Asn Arg His Leu Phe

35

40

45

aaa gaa aat aat ggg aat tta ttg atc aaa tgc acg cat gga aat ttc 192

Lys Glu Asn Asn Gly Asn Leu Leu Ile Lys Ser Thr His Gly Asn Phe

50

55

60

aat atc agg aac tcc aag caa att aaa gtc gtc gga gtg gag gat agg 240

Asn Ile Arg Asn Ser Lys Gln Ile Lys Val Val Gly Val Glu Asp Arg

65

70

75

80

gat att gcc att ctt caa atg cct aaa gac ttc cca ccc ttt gca cag 288

Asp Ile Ala Ile Leu Gln Met Pro Lys Asp Phe Pro Pro Phe Ala Gln

85

90

95

agg tta cga ttt aga aat cca ata gtg ggt gaa tca att tgt ctt gtt 336

Arg Leu Arg Phe Arg Asn Pro Ile Val Gly Glu Ser Ile Cys Leu Val

100

105

110

gga aat acg ttc caa gaa aag tac aat gca agc atc gtt tct gag aca 384

Gly Asn Thr Phe Gln Glu Lys Tyr Asn Ala Ser Ile Val Ser Glu Thr

115

120

125

agc aaa aca ttc cca cga gtt gaa ggt agt ttt tgg aaa cat tgg att 432

Ser Lys Thr Phe Pro Arg Val Glu Gly Ser Phe Trp Lys His Trp Ile

130

135

140

aat aca acg gaa gga cat tgt gga ttg cct tta gtt agt gtc act gat 480

Asn Thr Thr Glu Gly His Cys Gly Leu Pro Leu Val Ser Val Thr Asp

145

150

155

160

gga ttt att gta gga ata cat agt tta atg agt cat aag tac gat cat 528

Gly Phe Ile Val Gly Ile His Ser Leu Met Ser His Lys Tyr Asp His

75

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165

170

175

aat tat ttc tgc aac ttt gac gac gcg ttt gaa ggc gat tat att aac 576

Asn Tyr Phe Ser Asn Phe Asp Asp Ala Phe Glu Gly Asp Tyr Ile Asn

180

185

190

aag ttg aag gaa ctg aaa tgg gag cag aat tgg act tac aac gtt aat 624

Lys Leu Lys Glu Leu Lys Trp Glu Gln Asn Trp Thr Tyr Asn Val Asn

195

200

205

act gtt agt tgg ggc aac atg aaa ctt cag gat agt gct cca tgc aaa 672

Thr Val Ser Trp Gly Asn Met Lys Leu Gln Asp Ser Ala Pro Cys Lys

210

215

220

gaa ttc aaa aca act aag ttg att agc gac tta tgc acg gaa cct gtg 720

Glu Phe Lys Thr Thr Lys Leu Ile Ser Asp Leu Cys Thr Glu Pro Val

225

230

235

240

tgc gct cag

729

Cys Ala Gln

&lt;210&gt; 4

&lt;211&gt; 243

&lt;212&gt; PRT

&lt;213&gt; Papaya Leaf-Distortion Mosaic Virus

&lt;400&gt; 2



Gly Ala Ser Ser Val Lys Gly Leu Arg Asp Tyr Asn Gly Val Ala Ser  
 1 5 10 15

Ala Ile Cys Gln Leu Thr Asn Asn Ser Asn Gly Arg Ser Thr Thr Thr  
 20 25 30

Tyr Gly Val Gly Phe Gly Ser Tyr Ile Ile Val Asn Arg His Leu Phe  
 35 40 45

Lys Glu Asn Asn Gly Asn Leu Leu Ile Lys Ser Thr His Gly Asn Phe  
 50 55 60

Asn Ile Arg Asn Ser Lys Gln Ile Lys Val Val Gly Val Glu Asp Arg  
 65 70 75 80

Asp Ile Ala Ile Leu Gln Met Pro Lys Asp Phe Pro Pro Phe Ala Gln  
 85 90 95

Arg Leu Arg Phe Arg Asn Pro Ile Val Gly Glu Ser Ile Cys Leu Val  
 100 105 110

Gly Asn Thr Phe Gln Glu Lys Tyr Asn Ala Ser Ile Val Ser Glu Thr  
 115 120 125

Ser Lys Thr Phe Pro Arg Val Glu Gly Ser Phe Trp Lys His Trp Ile  
 130 135 140

Asn Thr Thr Glu Gly His Cys Gly Leu Pro Leu Val Ser Val Thr Asp

145                      150                      155                      160

Gly Phe Ile Val Gly Ile His Ser Leu Met Ser His Lys Tyr Asp His

165                      170                      175

Asn Tyr Phe Ser Asn Phe Asp Asp Ala Phe Glu Gly Asp Tyr Ile Asn

180                      185                      190

Lys Leu Lys Glu Leu Lys Trp Glu Gln Asn Trp Thr Tyr Asn Val Asn

195                      200                      205

Thr Val Ser Trp Gly Asn Met Lys Leu Gln Asp Ser Ala Pro Cys Lys

210                      215                      220

Glu Phe Lys Thr Thr Lys Leu Ile Ser Asp Leu Cys Thr Glu Pro Val

225                      230                      235                      240

Cys Ala Gln